



## CLUB REPEATERS

### VE3TBR

Phone: 767-7661  
Rx/Tx: 146.820/(-) MHz

### VE3YQT

Phone: 767-5492  
Rx/Tx: 147.060/(-) MHz

### VA3OLA

Rx/Tx: 53.050/(-) MHz

### VE3BGA

Rx/Tx: 145.450/(-) MHz

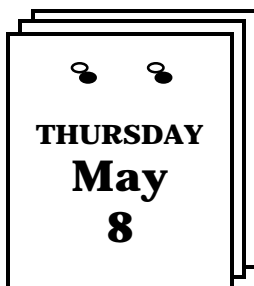
## WEEKLY BREAKFASTS

Saturdays 10:00 a.m.  
Blue Parrot Restaurant

### 2 METRE NET

Mondays 7:00 p.m.  
VE3YQT Repeater.

## NEXT MEETING



7:30 p.m., Room 207B  
Confederation College  
McIntyre Building

## RAC REPORT

Just returned from the Radio Amateurs of Canada meetings in Ottawa. Trying to compress a years a activities into 3 days makes for some pretty intense meetings. While the Executive and Directors exchange email during the year, face to face meetings are the ultimate solution.

A lot of issues were covered. One being why the new delegation process, ARAS/SARA did not go to completion? After 3 years of dedicated effort by dedicated amateurs Industry Canada decided not to proceed. Industry Canada was not prepared at this time to go ahead with the funding needed for the project. They are still looking at it and hopefully within the next couple of years it will get back on track. It would have been very beneficial to RAC. We would have been able to recover some of the costs we now incur representing the interests of Canadian amateurs who are not members of RAC. Trying to operate an organization of subscription fees is marginal at the best. Speaking of fees, membership is going up to \$39.95 effective September 1, 1997. If you want to save a \$1.95, get your renewal in early.

Little LEO's were discussed. They are looking at our VHF/UHF bands as possible targets. Did we come to a conclusion? Not yet, while they are asking for the

frequencies, or sharing of frequencies, this is not yet a reality. Their ideas of sharing frequencies, is to start out sharing and then to demand exclusive use as sharing is not satisfactory. When they file for divorce they want the house plus all the furniture. R We are helping to organize the opposition to these frequency hungry satellites, with presentations being prepared for Industry Canada and WRC 97. Is it possible we could lose some of these frequencies? Yes. Look at what happened in the U.S. with U.P.S. and 220 MHz. We hope to cut them off at the pass, but you can bet they will try and end run.

Amateur Radio Emergency Services was another subject that took up a fair amount of time. While ARES is a part of RAC a lot of discussion was directed to how

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## 1996/1997 LARC

### Founding President

P.J. (Pat) O'Shea, VE3FW  
1881-1972

In honour of the memory of our founding president, Mr. P.J. (Pat) O'Shea, the club call sign is VE3FW.

### Senate

Bill Roberts, VE3ARN  
Keith Fiske, VE3JQ  
Bert Lambert, VE3BKY  
Ray Greer, VE3CH  
Hugh Elliott, VE3EDW  
Bill Klemacki, VE3AJ

### Executive Board

<b>President:</b> Ian Mellis, VA3RIM	577-1628
<b>Vice Pres:</b> Ed Baumann, VE3SNW	622-1216
<b>Secretary:</b> Norm Bell, VE3XRC	577-9316
<b>Treasurer:</b> John Watson, VE3GTX	683-3199
<b>Directors:</b> Judy LeFevre, VA3EAP	622-7920
Dave Horne, VA3DVE	344-9325
Don Bel, VA3DPB	473-5482
Rob Van Wyck, VE3FLB	344-7845
<b>Mem.Sec:</b> John Watson, VE3GTX	683-3199
<b>PastPres:</b> Terry. Stewardson, VE3TKA	577-9439
<b>HI-Q Ed:</b> Robert Mazur, VA3ROM	344-7731

### Thunder Bay Voyageur Award

The Lakehead Amateur Radio Club in cooperation with the City of Thunder Bay, sponsors the Voyageur Award. Any SWL, scanner listener or ham monitoring or working 5 Thunder Bay amateur radio stations qualifies. Send your log copy with dates, times, frequencies, call signs and \$2.00 to the Awards Manager at the club address below.

### Club and Newsletter Information

*HI-Q* is published by the Lakehead Amateur Radio Club, Inc., an Ontario registered non-profit corporation. The opinions expressed or implied in issues of *HI-Q* are those of the author. The LARC assumes no responsibility for the accuracy or the information submitted.

Material in *HI-Q* may be copied for non-profit use provided that credit is given to the source. Contributions related to amateur radio, especially those articles of interest to Northwestern Ontario amateurs are encouraged. Material can be submitted in WordPerfect® format or as a text file via fax: 807-345-2688, packet: VA3ROM@VE3TKA, voice mail: VE3TBR repeater user 159 or via email: rmazur@tbaytel.net. Send material or dated announcements no later than the 25th of the month that it is to appear.

To reduce costs, advertising at the following per issued rates is accepted: full-page—\$60.00, 1/2 page—\$40.00, 1/4 page—\$20.00 and 1/8 page—\$15.00. Reduced rates (1/3 off) are available upon receipt of advance payment for 10 issues (one full year). Send your ad copy and cheque (payable to the LARC) to the club address listed below. Advertising in *HI-Q* does not imply an endorsement or recommendation of the product or service.

LARC membership fees are set for the year as follows: regular—\$30.00, associate—\$20.00, associate (attending ham classes)—\$90.00, student (attending school full-time)—\$15.00 and family—\$30.00 plus \$10.00 for each additional family member living at the same address. *HI-Q* is sent to all LARC members but only one copy is mailed to each address.

### Mailing Address

The Lakehead Amateur Radio Club, Inc., Suite 184, 1100C Memorial Avenue, Thunder Bay, ON, P7B 4A3, Canada.

### Internet Home Page

Get your copy of *HI-Q* electronically at:  
<http://www.tbaytel.net/srobb/larc.htm>.

### (RAC Report Continued from page 1)

RAC could benefit ARES members and groups. There are clubs and groups who are operating under the ARES banner that are not really members of ARES. Getting them into the fold is a prime concern. Expertise and assistance from a national organization can benefit the grass roots organizations.

Your club should have received the mailing from "The Insurance Centre Inc." Equipment and liability insurance is available, at a reasonable cost, for RAC affiliated clubs. There is no cost to affiliation, all you have to do is

call RAC headquarters and receive an affiliation number. While some clubs carry liability insurance, it is quite expensive. This new insurance could save a few dollars. The lawyers are waiting to pounce, make sure your covered. Another point, are your incorporation papers up to date? Clubs incorporate and then fail to keep up with yearly filings. Make sure any club you belong to is incorporated. It is your major protection against losing everything you own should a liability situation occur.—73, Pat Doherty, RAC Ontario North Director.

## LARC Public Service

Now that everyone has had an opportunity to rest up, recharge the batteries and tune up their handhelds, May will be a busy month for Public Service Events. First off the blocks is the Salvation Army Fund Drive which Norm Bell VE3XRC is directing and will require the assistance of a few operators.

On May 10, the annual Royal LePage Run for Women, with approximately 2500 entrants taking part will require the services of a few more operators to assist Norm Bell again. Hopefully they have some nice weather, seems last year was rather miserable. More running, of the more serious kind for some, in the Legion 10 Mile Road Race on May 19. Norm must have a fetish about directing road races as he, along with Moe, Pat, Dan, Bob, Carl, Ian and Judy plus hopefully

a few assistants, will see this one through.

And a week later, Eric Todd, along with Pat, Judy and a few more, will provide much needed communication facilities for the Hip Hip Hooray 1.6 Km walk along bicycle paths from the C J Saunders Fieldhouse at Lakehead University on behalf of Orthopedic Research and Treatment.

And as advance warning, three events in June, plus the BIG ONE in July. I will not be around for the first three weeks of May, we will be attending a wedding in Kitchener, so have fun, and make sure spring has sprung before we get back.

Do not want to hear that fishing was done off ice floes again this year on opening day.—73, Mike, VE3ZG.

# Meeting Minutes

by Norm, VE3XRC

**Minutes of a Meeting of the Lakehead Amateur Radio Club held in Room 207B at Confederation College, Thunder Bay, Ontario on April 10, 1997.**

The meeting was called to order at 7:30 p.m. by the President, VA3RIM, Ian Mellis with 37 members and guests in attendance. The meeting started with a round-table of those in attendance introducing themselves. A moment of silence was observed in memory of VE3EDW, Hugh Elliott who recently became a silent key.

## Minutes of the previous meeting:

The minutes of the previous meeting held March 13, 1997 were published in detail in the April edition of *HI-Q* and mailed to all members. **Motion:** moved by VA3JRS, Jan Sokoloski and seconded by VE3AJ, Bill Klemacki that the minutes be accepted as published. **Carried.**

**Motion:** moved by VE3GTX, John Watson and seconded by

VA3BEL, Vic Bel that the Treasurer's report be accepted. **Carried.**

**Correspondence:** club licences from Industry Canada

## Old Business:

**-CJ'97:** VE3FLB, Rob Van Wyck stated that a site for a donated 40' trailer has not been confirmed. VE3EFZ, Ken Rusnak is finalizing the teaching portion of the program. We are still looking for volunteers. The CJ site will not be available for field day.

**-Community Service:** VE3ZG, Mike Nawrocki stated that there would be four public service events during the month of May consisting of the Salvation Army Red Shield Appeal, Royal LePage Run for Women, Hip, Hip Hurrah Walk and the Legion 10 mile road race. The Walk For Hearts will take place on June 7, 1997. Mike will be looking for volunteers who will be available to provide directions and guidance during the jamboree for visiting amateurs coming onto town. A practice session will be held.

## New Business:

**-Thunder Bay Area Emergency Measures Generator:** VA3GD, Pat Doherty spoke on the past history of borrowing generators etc. for such events as field day. Two and a half years ago, the Lakehead Amateur Radio Club borrowed a Honda 3500 watt generator from the Thunder Bay Area Emergency Measures Organization which was stolen as well as a personal generator while in the Club's possession. The Thunder Bay Area Emergency Measures Organization is asking for reimbursement in the amount of \$1,000.00, approximately one half of the total replacement cost of the unit. Apparently they do not carry insurance on their equipment, but then neither does the LARC carry insurance on our own equipment.

This item was discussed at length at an earlier executive meeting. **Motion:** moved by VA3GD, Pat Doherty and seconded by VE3AJ, Bill Klemacki that the Lakehead Amateur Radio Club reimburse the Thunder Bay Area Emergency Measures Organization the sum of \$1,000.00 as full payment for the Honda generator that was stolen two and a half years ago.

A short discussion followed prior to the vote being called. For - 32, against - 0. **Carried.**

**-Emergency Measures Participation and Liability:** VA3GD, Pat Doherty pointed out that the question arose to our liability when we participate in EMO and Public Service Activities. Radio Amateurs of

(Continued on page 4)

## Treasurer's Report: VE3GTX, John Watson

<b>Balance as of February 28, 1997:</b>		<b>\$2,482.81</b>
<b>Income:</b> 50/50 Draw:	14.00	
	Membership: student	15.00
	Call Book	6.00
		<b>35.00</b>
<b>Expenses:</b> Thunder Bay Telephone	58.66	
	Mail Boxes Etc.	121.35
	Heart & Stroke (VE3JAB)	50.00
	T & S Radio	45.95
	Industry Canada	96.00
		<b>(371.96)</b>
<b>Balance as of March 31, 1997</b>		<b>\$2,145.85</b>

(Meeting Minutes Continued from page 3)

Canada will be offering an insurance package for liability and property coverage with a projected cost of approximately \$ 300.00 per year. Pat suggested that the Club rethink its policy on EMO exercises until the liability question is clarified. A committee has been set up consisting of VA3RIM, Ian Mellis, VE3GTX, John Watson, VE3XRC, Norm Bell, VE3BBS, Skip Wright and VA3GD, Pat Doherty to look at liabilities and events we

participate in.

**-Repeater Maps:** VE3UA, Jim O'Brien showed those in attendance a copy of a repeater directory he had purchased. This publication has been advertised in the Canadian Amateur magazine. Jim has made some inquiries as to buying in bulk. The individual price is \$7.00 and a quantity of 10 can be purchased for \$39.50 including taxes and shipping. The executive committee will look into this.

**-Adjournment:** moved by

VE3ZG, Mike Nawrocki and seconded by VE3FLB, Rob Van Wyck that the meeting be adjourned. **Carried.**

**50/50 Draw:** the winner of the 50/50 draw was VA3DPK, David Kovacs.

Following a short break, VE3XT, Bill Unger and VE3NPS, Nestor Procup explained the workings of a VHF packet station complete with a demonstration.

## It Shouldn't Work, But... by Dave, VE3AVS

It does! And quite well on most bands, thank you very much. With appropriate apologies to local antenna "experts" (XT, AJ, DP, et al), I will describe my "HF discone" antenna in layman's terms.

After seeing Norm's enormous (64 foot) erection put up at my QTH, I pondered briefly what kind of HF antenna to install. The end result is a 3-legged sort of long wire which tunes on all band (160m through 10m) and works out well, especially on the lower frequencies.

Visualize three long wire antennas, with insulators at each end, of course. The lengths are all

different, varying between 50 and 70 feet each. One end of each long wire is connected to each top corner of the tower. The insulators at these ends must be about one foot from the tower. Now, you take a piece of antenna wire and join all three wire together on the insulated sides (like a loop around the three wire.)

Strip enough insulation from your coax feedline so that the centre conductor can be connected to this "loop" of antenna wire. The braided portion of the coax cable is connected directly to the tower.

Now, you simply run out each long wire leg to a convenient power away from the tower

(corner of a roof, etc.) This puts your long wire at an approximate 45 degree angle coming down from the tower.

Connect your coax feedline to your transmitter through an antenna tuner. Fire up your rig and you'll be surprised how well you can do with "city-lot" size antenna.

Why does it work so well? Well, even the experts will agree that (1) it has sloping legs which allows for some vertical polarization (better distance), and (2) it obeys the basic axiom of antennas; the more wire you've got out there, the better!!

### NOTICE

Congratulations go out to Terry, VA3TFS, who successfully challenged the 12 word-per-minute endorsement on Saturday, April 12th, 1997. Now that Terry has his endorsement, code practice sessions on the VE3TBR repeater have ceased as of Monday, April 14th.—73, Dave, VE3AVS.

# Let's Get Digital—Hamcomm Interface

Would you like to be able to send and receive slow scan TV (SSTV) pictures in colour, play with weather facsimile and radio facsimile (WEFAX and FAX), work some high speed Morse code (CW), or radio teletype (RTTY), amateur radio over teletype (AMTOR) or narrow band radio telegraphy (NAVTEX, FEC B)? And, as a bonus, receive packet radio transmissions from the Dove satellite and terrestrial stations on HF and VHF? Normally, you would need a multimode terminal node controller (TNC) which costs big bucks. But, a simple to build and easy to use hardware interface allows you to do all this easily and cheaply.

## Interface and Software

The interface is popularity known as the "Hamcomm" interface, which is also the name of the program which uses the interface. The three programs that are on the Internet and local BBSes are HAMCOMM, JVFAX and PKTMON. You can find links to these programs and others at [www.tigertronics.com](http://www.tigertronics.com) and [www.accessone.com/~tmayhan](http://www.accessone.com/~tmayhan). I've uploaded copies to The Mailbox BBS and Online Now also has copies available for downloading.

## Parts List

There are really no exotic parts for this interface. Any ham with a well stocked junk box could put this device together for next to nothing. The schematics are on page 8.

C1, C4	0.1 uf
C2, C3	10 uf @ 16 VDC electrolyte or tant.
C5, C6	0.2 uf

D1-D3	IN9148 or 4148 diodes
J1	RCA phone jack
J2	Stereo phone jack

Both J1 and J2 can be replaced with a 5-pin DIN plug or socket and wired to accept a TNC cable hookup to your HT or HF rig.

J3	25 pin D-connector male or female as required
Q1	NPN general purpose transistor 2N2222, etc.
R1, R2	100k
R3	10k PC mount trim pot
R4, R5	15k
R6	10k
R7	1k
U1	741 Op Amp, 8 pin DIP

Bill, VE3XT and Wayne, VA3WRL have built these interfaces. Bill went built his inside the hood of a DB25 using "dead bug" construction! We have been playing on RTTY on 145.800 MHz, so if you've been hearing strange noises on that frequency you can bet it's one of us or Gerry, VA3BRN or Dave, VE3AVS.

## What's Out There

We are using 145.800 MHz, 2m simplex for in town use, although the MIR space station is also using this frequency as the downlink for FM voice and packet, MIR has suspended all amateur radio operations until further notice.

For SSTV, every Saturday there are 2 nets at 1500 and 1800 UTC on 14.230 MHz, which is the 20m SSTV calling and working frequency. Weekends are the best bit to try JVFAX and SSTV.

On the commercial side, you can pick up WEFAX 576 on 6496 kHz

which is the CFH Halifax METOC frequency. Halifax broadcasts 24 hours a day. If you tune USB mode the data signal is 1.9 kHz BELOW the carrier and in LSB mode it's 1.9 kHz ABOVE the carrier. Most publications list the centre carrier frequency. The deviation for WEFAX 576 is 400 Hz.

The 6 to 9 MHz and 12-16 MHz bands have lots of WEFAX and RTTY signals from U.S. and Canadian Guard Stations as well as amateur radio signals. RTTY shifts are usually 600 Hz and 75 baud. Hamcomm has a built in spectral, tuning and baud display to figure out a signal's shift, baud rate and visual tuning between the MARK and SPACE signals. The Internet and local BBSes are a source of frequency listings.

## PC Board Available

Thanks to Dave, VE3AVS, a pc board is available for club members to build the Hamcomm circuit on. I want some input from those who get this newsletter. If there is enough interest we can make kits of this circuit by ordering the parts from an electronic supply company. Also, if there is an interest, I'll have Dave burn a DB25 pc board so that everything can fit into a DB25 hood but easier to build. Again, let me know if you are interested. The pc board is approximately 2 x 3 inches.

I also have a few pages of frequencies that I can make copies of and distributed to those how don't have Internet or email access. Also, I can supply the software. These programs are DOS only and don't need a fancy

*(Continued on page 6)*

*(Let's Get Digital Continued from page 5)* dancy Pentium and won't work under Windows 3.1 or 95. In fact, a lowly 286 will do the job nicely, so get that old door stop out and put it to use in the digital world.

The only difficult part in the whole process is constructing the cable to connect your rig to the interface. There is no standard since each rig has it's own wiring requirements. I do have a listing of all the popular HTs and the wiring diagrams for cables. HF rigs usually have an accessory jack where audio and PTT and mic functions can be controlled from. Your owner's manual will describe how to wire a cable up.

Basically, you wire your rig to work with an AFSK signal (audio frequency shift keying) which is basically the same cable hookup that is used for packet radio, so most packet users will be able to use the same cable with the Hamcomm interface to their 2m HTs.

If you have a fairly good shortwave radio you can still use the interface to copy signals and just build the receive only version of the interface. The Hamcomm software has a pretty decent spectrum analyzer and frequency display scope. You can see how good your receiver is and will see any drift very quickly. A digital signal needs a stable base to work from so that the software can do it's job.

### Why Bother to Build?

Well, if you have a 100 bucks handy you can buy this same interface plus a packet TNC from Tigertronics. But, if you find out that you don't like digital for some reason, you have a very expensive piece of electronics that you may not be able to get rid of. The homebrew interface is

cheaper to build and you will learn something about building and experimenting with the digital modes, and that's what amateur radio is all about.

Also, with the little LEO threat, hams to start flooding the spectrum that we have and may lose if we don't get other than voice signals using this dead air. Also, digital signals can get through with less power and bandwidth under extreme conditions and interference from other signals. Since a picture is worth a thousand words wouldn't you like to be able to send pictures, diagrams and maps around town and the world?

I always had a prejudice towards digital modes (CW excluded). I then picked up a second hand TNC to try packet. After finding information on the Hamcomm interface from the Internet. I built the circuit and started finding out that there's are lot of neat stuff going on in the world that is passing most hams by. All you apartment and antenna restricted amateurs should jump at a chance to work digital on 2 metres and receive HF digital signals with indoor antennas.

We have kept the interface pretty simple to build. The only tools required are a 30 watt soldering iron with a fine tip, side cutters and some solder. Anyone who has never built a kit before should try this one. Dave's pc board is extremely easier to solder on and the layout is quite spacious, so it's easier to mount the components.

I would like to hear from those who are interested in this interface or you can talk to Wayne, VA3WRL at a coffee call since he has built the interface, too. 73—Bob, VA3ROM.

# Ham Puzzler

by Dave, VE3AVS

The answers for the March puzzler by Randy, VA3GOT as follows:

4 Q. In a G. = 4 quarts in a gallon.

57 = H.V. = 57 Heinz Varieties

29 D. In F. in a L.Y. = 29 days in a leaf year.

64 = S. On a C.B. = 64 squares on a Checker Board

88 = K. On a P. = 88 Keys On a Piano

*Unscramble the four jumbled words. Then arrange the shaded letters to form a word or words associated with the callsign shown below.*

**V E 3 G T X**

□ □ □ □ □ □ □ □

D E O N A  
□ □ □ □ □ □

R E E K Y  
□ □ □ □ □ □

G N O A A L  
□ □ □ □ □ □ □

G H M M O E  
□ □ □ □ □ □ □

Answers in next month's issue of *HI-Q*.

# Swap & Shop

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**Yaesu FT411E:** 2 metre Handheld. Comes with 2, 5 watt battery packs; alkaline battery pack; 1, 2 watt battery pack, desktop quickcharger and Yaesu speaker mic. Asking \$500.00 firm. Contact Al, VA3IOU for more information.

**Morse Tutor:** Made by Computer Aided Technologies. 5 to 31 w.p.m., random code or structured code practice; programmable. Neat toy if you want to learn or practice CW anywhere. Asking \$70.00 OBO. Contact Wayne, VA3WRL for more information.

**Hamcomm:** Bob, VA3ROM has a built Hamcomm interface, free to a good home to someone who is going to actually use it. Prefer someone who already has a TNC cable to HT or HF rig and computer and software savvy and who likes to experiment in digital.

## CJ'97 Highlights

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*The following information is from the official CJ'97 website. It is accessible from the LARC home page. They are really doing a fine job in promoting the effect and the local area, especially, of course the city of Thunder Bay.*

*Over 10,000 participants have registered to attend this event, so far!*

### Welcome

This jamboree is being held in one of the most unique areas in Canada, the place where east meets west, where the Voyageurs from the east met the fur traders from the west and is now celebrated annually at Rendezvous at Old Fort William, where the Great Lakes shipping meets the railway from the west, almost in the geographic centre of our country.

It is a land of many resources, being in the heart of some of the greatest hiking and canoeing in the world, situated on the shores of Lake Superior, thus offering some of the best fresh water sailing available anywhere. Many ethnic groups, along with the First Nations peoples, were instrumental in the settlement and development of the area.

This is a land where the people welcome visitors at any time,

where Terry Fox ended his Marathon of Hope, where Native legends, such as that of the Sleeping Giant, intrigue. Provincial Parks abound with wildlife and hiking trails with breath-taking vistas. Amethyst, Ontario's official gemstone, is mined here in one of the largest Amethyst mines in the world. These are but some of the local attractions that will be available to those choosing to be part of the 9th Canadian Jamboree in 1997.

### Themes

The CJ'97 program has been designed around eight themes that reflect these attractions: geology, water, heritage, fur trade, transportation, communication, forestry and fishing. At each of the program sites, activities representing most of these themes will be offered, thus enabling units to follow a theme of interest throughout the jamboree, as one component of the challenge award, and still be able to take part in a wide variety of challenges and experiences without being limited to one or two sites.

### Repeater Information

The wide range talk-in frequency will be on repeater

VE3YQT, 147.060 MHz (-600 off set). Within the city limits repeater CJ3FW 147.390 MHz (+600 offset) will be available for further information and help.

### Site Information

Despite a wet summer, CJ'97 site development at Boulevard Lake is on schedule. Roadbeds through the site are completed, and nine of the ten sub-camp areas are virtually ready to welcome campers. The sub-camp areas have been cleared, drained, filled, levelled, and hydraseeded so grass will be ready by the start of the Jamboree.

A unique feature of CJ'97 will be some camping opportunities in heavily wooded areas. The dense undergrowth and heavy brush have been cleared in these areas, making them ideal for a "back to nature" camping experience.

### Help Wanted

While over 1500 volunteers have registered for CJ'97, more people are needed to help provide the jamboree's exciting programs and activities to over 10,000 participants. We especially need adults with lifeguarding skills or mountain biking experience to help with the programs.

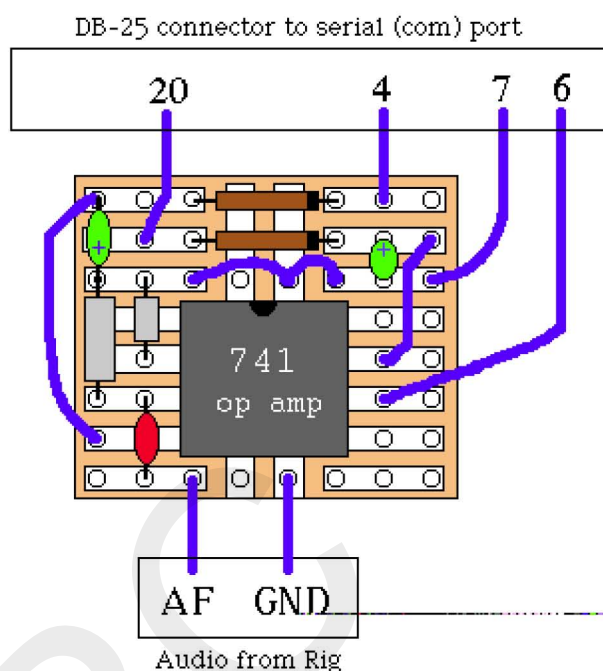


## HamComm 3.0 (comparator) Receive Circuit also for use with JVFX and PKTMON

Parts Quantity	Radio Shack Part Number	
1	272-109	.1uF
2	272-1436	10uF
4	276-1122	1N914
1	276-007	741 op amp
2	271-1347	100k
1	276-150	PC board
1	276-1549	DB-25 case
1	276-1547	DB-25 male
1		Audio cable to radio
1		Some hook up wire

The schematics are included with these program doc's. The shorter 1N914's and one of the 100k need to be mounted vertical (on end) to fit. The 10uF and 1uF were picked because of the parts small size. Note the polarization of the two 10uF. Also, note that some parts and jumpers share the same holes. This will fit inside of a DB-25 case. You may need a female DB-25 end instead of the male end in the above parts list.

This is a simply circuit. Build it at your own risk, and READ the doc's for these programs!



By **WB5NBQ**  
Ron Wilson

### HC-01 Schematic

